functioning system. In the heart, the veins, atria, ventricles, and arteries must be appropriately spatially related to each other. Further, the valves must be located at the right place and oriented so as to prevent blood from flowing backwards through the system. This exemplifies the fact that the parts of a mechanism are organized. Its operations also are organized. Each may occur in its turn – a simple temporal ordering – or there may be a good deal of overlap, interdependency, or other complications. As the timing becomes more complex, especially in mechanisms with many parts, we further say that the operations are *orchestrated* so as to produce the phenomenon of interest. For example, the phenomenon of the heart pumping blood depends on the spatial organization of the component parts, the temporal organization of the component operations (movements), and the fine-grained spatiotemporal orchestration of the moving parts in real time.

There are several reasons organization is so important. If one part is to operate on the product produced by the operation of another part, it needs to have reliable access to that product. One way to ensure this is for the two parts to be spatially contiguous. Another is to provide a mode of transport between them. The assembly lines used in human manufacturing adopt this mode of organization – components are brought to the line and added to the emerging product in sequence. Organization in biological systems, however, is seldom as simple as the sequential arrangement used in assembly lines. One of the key features of organization in biological mechanisms is the incorporation of feedback and other kinds of control systems that allow the behavior of some components of the mechanism to be regulated by other components of the mechanism. The role of more complex modes of organization is a major feature that renders the biological conception of mechanism different from that which suffices for non-biological mechanisms, as discussed further in Section 6.

4. REPRESENTING AND REASONING ABOUT MECHANISMS

Mechanisms are real systems in nature, which led Salmon (1984) to identify his causal-mechanical approach to explanation as *ontic*, as it appeals to the actual mechanism in nature. He contrasted it with an *epistemic* conception of explanation that appeals to laws and derivations from laws, which are clearly products of mental activities. Salmon's insight is important, but the ontic/epistemic distinction does not properly capture it. He is right that in mechanistic explanation a scientist appeals to causal relations and mechanisms operative in nature, which are taken to generate or produce the

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